

Line It Up

Use scatter plot patterns to choose and judge straight-line models.

GRADE 8 • 8.FGR.6.1

8.FGR.6.1 "Show that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, visually fit a straight line..."

NAME _____

DATE _____

SPOT THE LINE

Straight lines can model two quantities when the points in a scatter plot follow a roughly steady upward or downward pattern. A line of best fit should pass near the middle of the points. The smaller the vertical gaps between the points and the line, the better the fit.

WORKED EXAMPLE

A scatter plot includes the points (31,360), (32,371), and (33,382). Find a straight-line model.

1. When x increases by 1, y increases by 11.
2. Use a slope of 11.
3. Check the point (31,360): $11(31) + 19 = 360$.
4. The model is $y = 11x + 19$.

Answer: $y = 11x + 19$

PRACTICE 6 problems

- 1** A scatter plot has points (5,10), (6,12), and (7,14). Does the plot suggest a positive, negative, or no linear association?

ANSWER _____

- 2** For the point (6,27), find its vertical distance from the line $y = 5x - 8$.

ANSWER _____

- 3** The points are (5,18), (6,23), and (7,28). Which line fits better, Line A: $y = 5x - 7$ or Line B: $y = 6x - 18$?

ANSWER _____

- 4** The points (5,18), (6,23), (7,28), and (8,35) follow a mostly linear trend. Which point is farthest from the trend, and how would it affect a line of best fit?

ANSWER _____

- 5** The points (5,23), (6,27), and (7,33) are compared with $y = 6x - 8$. Is this a close fit? Use vertical distances to support your answer.

ANSWER _____

- 6** The points (5,35), (6,30), (7,25), and (8,20) are plotted. Describe the association and give a line that fits the points.

ANSWER _____

APPLY IT Show your work

- 1** A student records the minutes spent practicing a game and the number of skill points earned: (10,8), (20,14), (30,20), and (40,26). Which model fits better, $y = 3x/5 + 2$ or $y = x/2 + 3$? Describe the fit.

WORK SPACE

ANSWER _____

- 2** A phone has these numbers of photos and storage used in megabytes: (5,12), (10,22), (15,32), and (20,45). The line $y = 2x + 2$ models the data. Is the model a good fit, and which point is farthest from the line?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Two lines are compared with the points (5,37), (6,42), (7,47), and (8,53). Line A is $y = 5x + 12$. Line B is $y = 6x + 7$. Find the total vertical distance for each line, then explain which line is the better fit.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A scatter plot has points (5,10), (6,12), and (7,14). Does the plot suggest a positive, negative, or no linear association?	positive linear association
2	For the point (6,27), find its vertical distance from the line $y = 5x - 8$.	5 units
3	The points are (5,18), (6,23), and (7,28). Which line fits better, Line A: $y = 5x - 7$ or Line B: $y = 6x - 18$?	Line A: $y = 5x - 7$. Its total vertical distance is 0, while Line B's total vertical distance is 15.
4	The points (5,18), (6,23), (7,28), and (8,35) follow a mostly linear trend. Which point is farthest from the trend, and how would it affect a line of best fit?	(8,35). It is above the trend and would pull the line of best fit upward.
5	The points (5,23), (6,27), and (7,33) are compared with $y = 6x - 8$. Is this a close fit? Use vertical distances to support your answer.	Yes. Each point is 1 unit from the line, so the fit is close.
6	The points (5,35), (6,30), (7,25), and (8,20) are plotted. Describe the association and give a line that fits the points.	negative linear association; $y = -5x + 60$

PART 2 • APPLY IT

- $y = 3x/5 + 2$. It is a perfect fit because every data point is on the line.** Substitute each x-value into both models. The first model gives 8, 14, 20, and 26, matching all four data values.
- The model is a good but not perfect fit. The point (20,45) is farthest from the line, 3 units above it.** The line matches the first three points exactly. At $x = 20$, the line predicts 42 instead of 45, so that point has the largest vertical gap.

CHALLENGE

Line A has a total vertical distance of 1. Line B has a total vertical distance of 5. Line A is the better fit because its points are closer overall.

Accept equivalent statements such as "upward linear trend" for positive linear association and "downward linear trend" for negative linear association. For fit explanations, accept reasoning that correctly compares vertical gaps, even if students do not use the phrase "total vertical distance."